

Claims

What is claimed is:

- 1 1. A computer-implemented method for unconscious data retrieval, comprising:
 - 2 extracting at least one query key from a primary document;
 - 4 querying at least one data source with the at least one query key;
 - 5 receiving at least one query result from at least one data source;
 - 6 evaluating the received at least one query result; and
 - 7 displaying at least one received query result;
- 8 wherein extracting, querying, receiving, and evaluating are performed
- 9 without user interaction.
- 1 2. The method of claim 1, further comprising, prior to extracting:
 - 2 receiving the primary document;
- 3 and wherein extracting, querying, receiving, and evaluating are performed in response to receiving the primary document.
- 1 3. The method of claim 1, further comprising, prior to extracting:
 - 2 accessing the primary document;

3 and wherein extracting, querying, receiving, and evaluating are per-
4 formed in response to accessing the primary document.

1 4. The method of claim 1, further comprising, prior to extracting:
2 displaying the primary document;

3 and wherein extracting, querying, receiving, and evaluating are per-
4 formed in response to displaying the primary document.

1 5. The method of claim 1, wherein the primary document comprises an
2 electronic communication.

1 6. The method of claim 5, wherein the primary document comprises an e-
2 mail message.

1 7. The method of claim 5, further comprising, prior to extracting:
2 receiving the electronic communication;

3 and wherein extracting, querying, receiving, and evaluating are per-
4 formed in response to receiving the electronic communication.

1 8. The method of claim 7, wherein receiving the electronic communication
2 comprises receiving the electronic communication at an e-mail server.

1 9. The method of claim 7, wherein receiving the electronic communication
2 comprises receiving the electronic communication at a user's computer.

1 10. The method of claim 7, wherein receiving the electronic communica-
2 tion comprises retrieving the electronic communication from an e-mail server to
3 a user's computer.

1 11. The method of claim 1, wherein extracting, querying, receiving, and
2 evaluating are performed asynchronously with respect to user interaction with
3 the primary document.

1 12. The method of claim 1, further comprising:
2 storing the evaluated at least one query result;

3 and wherein displaying at least one received query result comprises:
4 retrieving the stored at least one query result; and
5 displaying the retrieved at least one query result.

1 13. The method of claim 1, further comprising:
2 storing the evaluated at least one query result;

3 and wherein displaying at least one received query result comprises:
4 receiving a query request from a user;

5 displaying a preview of at least one query result item responsive to the re-
6 ceived query request;
7 receiving a selection of one of the previewed items;
8 retrieving the selected item; and
9 displaying a representation of the selected item.

1 14. The method of claim 13, wherein retrieving the selected item com-
2 prises retrieving the item from a cache.

1 15. The method of claim 13, wherein retrieving the selected item com-
2 prises retrieving a text version of the item from a cache.

1 16. The method of claim 13, wherein retrieving the selected item com-
2 prises asynchronously retrieving the selected item.

1 17. The method of claim 16, further comprising:
2 notifying the user upon completion of the asynchronous retrieval of the
3 selected item.

1 18. The method of claim 1, wherein querying at least one data source
2 comprises transmitting a query over a network.

1 19. The method of claim 1, wherein querying at least one data source
2 comprises transmitting an e-mail message containing a query to the at least one
3 data source.

1 20. The method of claim 1, wherein querying at least one data source
2 comprises transmitting across a firewall an e-mail message containing a query to
3 the at least one data source.

1 21. The method of claim 1, wherein querying at least one data source
2 comprises transmitting an XML-encoded e-mail message containing a query to
3 the at least one data source.

1 22. The method of claim 1, wherein receiving at least one query result
2 from at least one data source comprises receiving an e-mail message containing
3 at least one query result from at least one data source.

1 23. The method of claim 1, wherein receiving at least one query result
2 from at least one data source comprises receiving an XML-encoded e-mail mes-
3 sage containing at least one query result from at least one data source.

1 24. The method of claim 1, wherein the at least one data source comprises
2 at least one information appliance.

1 25. The method of claim 24, wherein at least one of the information appli-
2 ances comprises one selected from the group consisting of:
3 a visitor kiosk;
4 a meeting recorder;
5 a presentation recorder;
6 a whiteboard capture device;
7 a communication device; and
8 a document management device.

1 26. The method of claim 1, wherein evaluating the received at least one
2 query result comprises estimating the relevance of the query result with respect
3 to the primary document.

1 27. The method of claim 1, wherein evaluating the received at least one
2 query result comprises determining whether the query result has previously
3 been displayed.

1 28. The method of claim 1, wherein evaluating the received at least one
2 query result comprises determining whether the query result is sufficiently rele-
3 vant with respect to a predetermined relevancy threshold;

4 and wherein displaying at least one received query result comprises dis-
5 playing a query result responsive to the determination indicating that the query
6 result is sufficiently relevant.

1 29. The method of claim 1, wherein displaying at least one received query
2 result comprises determining displaying at least one received query result in a
3 sequence prioritized according to estimated relevance.

1 30. The method of claim 1, further comprising:

2 after receiving at least one query result, determining whether an addi-

3 tional query should be performed;

4 responsive to a determination that an additional query should be per-
5 formed:

6 formulating an additional query containing at least one secondary
7 query key;

8 querying at least one data source with the at least one secondary
9 query key;

10 receiving at least one secondary query result from at least one data
11 source; and

12 displaying at least one received secondary query result;

1 31. The method of claim 30, wherein formulating an additional query
2 comprises formulating an additional query comprising at least one query key
3 from the primary document and at least one secondary query key.

1 32. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in the context of a currently active
3 software application.

1 33. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in a sidebar pane adjacent to a cur-
3 rently active on-screen window.

1 34. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in an on-screen window concur-
3 rently with display of a currently active on-screen window.

1 35. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in an on-screen dialog box.

1 36. The method of claim 1, wherein at least a portion of the displayed
2 query result comprises a hyperlink to a resource containing data related to the
3 displayed query result.

1 37. The method of claim 1, wherein the at least one received query result
2 comprises a plurality of query results, the method further comprising:
3 prioritizing the query results according to estimated relevance;
4 and wherein displaying at least one received query result comprises dis-
5 playing a plurality of query results in order of priority.

1 38. The method of claim 37, wherein prioritizing the query results is per-
2 formed responsive to the context of the query results.

1 39. The method of claim 37, wherein prioritizing the query results is per-
2 formed responsive to the context of the query key in the primary document.

1 40. The method of claim 1, wherein at least one of the data sources com-
2 prises a network-connected computer containing shared information.

1 41. The method of claim 1, wherein at least one of the data sources com-
2 prises a shared directory.

1 42. The method of claim 1, wherein at least one of the data sources is in-
2 termittently connected via a network.

1 43. The method of claim 1, wherein the primary document is one selected
2 from the group consisting of:

3 an electronic communication;

4 a word processing document;

5 a spreadsheet document;

6 a task item;

7 a calendar item;

8 a file;

9 an image;

10 a sound recording;

11 a video recording; and

12 a contact record.

1 44. The method of claim 1, wherein querying at least one data source

2 comprises:

3 formulating a structured query based on the extracted at least one query

4 key; and

5 transmitting the structured query to the at least one data source.

1 45. The method of claim 1, wherein extracting at least one query key

2 comprises applying a part-of-speech analysis to the primary document.

1 46. The method of claim 1, further comprising:

2 selecting at least one data source based on the extracted at least one query

3 key;

4 and wherein querying at least one data source comprises querying the se-
5 lected at least one data source.

1 47. The method of claim 1, wherein evaluating the received at least one
2 query result comprises applying a Bayesian belief net to determine estimated
3 relevance of the at least one query result.

1 48. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the result on a device that is intermittently connected
3 via a network.

1 49. The method of claim 48, wherein the device comprises a portable com-
2 puting device.

1 50. The method of claim 1, wherein the primary document comprises a
2 text document.

1 51. The method of claim 1, wherein the primary document comprises a
2 non-text document.

1 52. The method of claim 1, wherein querying at least one data source
2 comprises transmitting a text query.

1 53. The method of claim 1, wherein querying at least one data source
2 comprises transmitting a non-text query.

1 54. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in a calendar display.

1 55. The method of claim 1, wherein displaying at least one received query
2 result comprises displaying the query result in a user-activated toolbar menu.

1 56. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 designating at least a portion of the primary document as a hyperlink; and
4 responsive to user activation of the hyperlink, displaying a query result.

1 57. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 displaying an on-screen button; and
4 responsive to user activation of the button, displaying a query result.

1 58. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 displaying a toolbar menu activation button; and
4 responsive to user activation of the button, displaying a query result.

1 59. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 displaying a menu comprising at least one command; and
4 responsive to user selection of one of the at least one command, display-
5 ing a query result.

1 60. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 displaying a menu activation icon;
4 responsive to user activation of the menu activation icon, displaying a
5 menu comprising at least one command; and
6 responsive to user selection of one of the at least one command, display-
7 ing a query result.

1 61. The method of claim 1, wherein displaying at least one received query
2 result comprises:

3 recognizing user-entered text as having a format corresponding to a pre-
4 defined data type;
5 displaying a menu comprising at least one command applicable to the
6 data type; and
7 responsive to user selection of one of the at least one command, display-
8 ing a query result.

1 62. A computer-implemented system for unconscious data retrieval, com-
2 prising:

3 a receiver, for receiving a primary document;

4 a requester, coupled to the receiver, for generating and transmitting to at

5 least one data source at least one query related to the primary

6 document;

7 an evaluator, for receiving at least one query result from the at least one

8 data source and for evaluating the received at least one query

9 result; and

10 a display, coupled to the evaluator, for displaying the at least one received

11 query result;

12 wherein the receiver, the requester, and the evaluator operate without

13 user interaction.

1 63. The system of claim 62, wherein the primary document comprises an

2 electronic communication.

1 64. The system of claim 63, wherein the primary document comprises an

2 e-mail message.

1 65. The system of claim 64, wherein the receiver comprises an e-mail

2 server.

1 66. The system of claim 64, wherein the receiver comprises an e-mail pro-

2 gram running on a user's computer.

1 67. The system of claim 62, wherein the requester and the evaluator oper-
2 ate asynchronously with respect to user interaction with the primary document.

1 68. The system of claim 62, further comprising:
2 a storage device, coupled to the evaluator, for storing the evaluated at

3 least one query result;

4 and wherein the display displays at least one received query result re-
5 trieval from the storage device.

1 69. The system of claim 62, further comprising:

2 a storage device, coupled to the evaluator, for storing the evaluated at
3 least one query result; and

4 an input device for receiving a query request from a user;

5 and wherein the display further displays a query preview interface show-
6 ing at least one query result item responsive to the received query request, and,
7 responsive to a selection of one of the previewed items, displays a representation
8 of the selected item.

1 70. The system of claim 69, wherein:
2 the storage device comprises a cache; and
3 the at least one query result item is retrieved from the cache.

1 71. The system of claim 69, wherein:
2 the storage device comprises a text cache; and
3 the representation of the at least one query result item is retrieved from
4 the text cache.

1 72. The system of claim 69, wherein:
2 the requester generates and transmits to at least one data source a request
3 for the selected item; and
4 the receiver receives the selected item asynchronously.

1 73. The system of claim 72, further comprising:
2 a notifier, coupled to the receiver, for notifying the user upon completion
3 of the asynchronous retrieval of the selected item.

1 74. The system of claim 62, wherein the requester transmits the query
2 over a network.

1 75. The system of claim 62, wherein the requester transmits an e-mail
2 message containing a query to the at least one data source.

1 76. The system of claim 62, wherein the requester transmits across a fire-
2 wall an e-mail message containing a query to the at least one data source.

1 77. The system of claim 62, wherein the evaluator receives an e-mail mes-
2 sage containing at least one query result from at least one data source.

1 78. The system of claim 62, wherein the at least one data source comprises
2 at least one information appliance.

1 79. The system of claim 78, wherein at least one of the information appli-
2 ances comprises one selected from the group consisting of:

- 3 a visitor kiosk;
- 4 a meeting recorder;
- 5 a presentation recorder;
- 6 a whiteboard capture device;
- 7 a communication device; and
- 8 a document management device.

1 80. The system of claim 62, wherein the evaluator estimates the relevance
2 of the query result with respect to the primary document.

1 81. The system of claim 62, wherein the evaluator determines whether the
2 query result is sufficiently relevant with respect to a predetermined relevancy
3 threshold;

4 and wherein the display displays a query result responsive to the deter-
5 mination indicating that the query result is sufficiently relevant.

1 82. The system of claim 62, wherein the display displays at least one re-
2 ceived query result in a sequence prioritized according to estimated relevance.

1 83. The system of claim 62, wherein the display displays the query result
2 in the context of a currently active software application.

1 84. The system of claim 62, wherein the display comprises a sidebar pane
2 adjacent to a currently active on-screen window.

1 85. The system of claim 62, wherein the display comprises an on-screen
2 window shown concurrently with a currently active on-screen window.

1 86. The system of claim 62, wherein the display comprises an on-screen
2 dialog box.

1 87. The system of claim 62, wherein at least a portion of the displayed
2 query result comprises a hyperlink to a resource containing data related to the
3 displayed query result.

1 88. The system of claim 62, wherein at least one of the data sources com-
2 prises a network-connected computer containing shared information.

1 89. The system of claim 62, wherein at least one of the data sources com-
2 prises a shared directory.

1 90. The system of claim 62, wherein at least one of the data sources is in-
2 termittently connected via a network.

1 91. The system of claim 62, wherein the primary document is one selected
2 from the group consisting of:

3 an electronic communication;
4 a word processing document;
5 a spreadsheet document;
6 a task item;
7 a calendar item;
8 a file;
9 an image;
10 a sound recording;
11 a video recording; and
12 a contact record.

1 92. The system of claim 62, wherein the requester comprises:
2 a query formulator, for formulating a structured query based on the ex-
3 tracted at least one query key; and

4 a transmitter, coupled to the query formulator, for transmitting the struc-
5 tured query to the at least one data source.

1 93. The system of claim 62, wherein the evaluator applies a Bayesian be-
2 lief net to determine estimated relevance of the at least one query result.

1 94. The system of claim 62, wherein the display comprises a portable com-
2 puting device.

1 95. The system of claim 62, wherein the primary document comprises a
2 text document.

1 96. The system of claim 62, wherein the primary document comprises a
2 non-text document.

1 97. The system of claim 62, wherein the display comprises a calendar dis-
2 play.

1 98. The system of claim 62, wherein the display comprises a user-
2 activated toolbar menu.

1 99. A computer program product comprising a computer-readable medium
2 having computer-readable code embodied therein for unconscious data retrieval,
3 comprising:

4 computer-readable program code configured to cause a computer to ex-
5 tract at least one query key from a primary document;
6 computer-readable program code configured to cause a computer to
7 query at least one data source with the at least one query key;
8 computer-readable program code configured to cause a computer to re-
9 ceive at least one query result from at least one data source;
10 computer-readable program code configured to cause a computer to
11 evaluate the received at least one query result; and
12 computer-readable program code configured to cause a computer to dis-
13 play at least one received query result;
14 wherein the computer-readable program code configured to cause a com-
15 puter to extract, query, receive, and evaluate operate without user interaction.

1 100. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to extract, query, receive,
3 and evaluate operate asynchronously with respect to user interaction with the
4 primary document.

1 101. The computer program product of claim 99, further comprising:
2 computer-readable program code configured to cause a computer to store
3 the evaluated at least one query result;

4 and wherein the computer-readable program code configured to cause a
5 computer to display at least one received query result comprises:
6 computer-readable program code configured to cause a computer to re-
7 trieve the stored at least one query result; and
8 computer-readable program code configured to cause a computer to dis-
9 play the retrieved at least one query result.

1 102. The computer program product of claim 99, further comprising:
2 computer-readable program code configured to cause a computer to store
3 the evaluated at least one query result;
4 and wherein the computer-readable program code configured to cause a
5 computer to display at least one received query result comprises:
6 computer-readable program code configured to cause a computer to re-
7 ceive a query request from a user;
8 computer-readable program code configured to cause a computer to dis-
9 play a preview of at least one query result item responsive to
10 the received query request;
11 computer-readable program code configured to cause a computer to re-
12 ceive a selection of one of the previewed items;
13 computer-readable program code configured to cause a computer to re-
14 trieve the selected item; and

15 computer-readable program code configured to cause a computer to dis-
16 play a representation of the selected item.

1 103. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to query at least one data
3 source comprises computer-readable program code configured to cause a com-
4 puter to transmit a query over a network.

1 104. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to query at least one data
3 source comprises computer-readable program code configured to cause a com-
4 puter to transmit an e-mail message containing a query to the at least one data
5 source.

1 105. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to query at least one data
3 source comprises computer-readable program code configured to cause a com-
4 puter to transmit across a firewall an e-mail message containing a query to the at
5 least one data source.

1 106. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to query at least one data
3 source comprises computer-readable program code configured to cause a com-

4 puter to transmit an XML-encoded e-mail message containing a query to the at
5 least one data source.

1 107. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to receive at least one
3 query result from at least one data source comprises computer-readable program
4 code configured to cause a computer to receive an e-mail message containing at
5 least one query result from at least one data source.

1 108. The computer program product of claim 99, wherein the at least one
2 data source comprises at least one information appliance.

1 109. The computer program product of claim 108, wherein at least one of
2 the information appliances comprises one selected from the group consisting of:
3 a visitor kiosk;
4 a meeting recorder;
5 a presentation recorder;
6 a whiteboard capture device;
7 a communication device; and
8 a document management device.

1 110. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to evaluate the received

3 at least one query result comprises computer-readable program code configured
4 to cause a computer to estimate the relevance of the query result with respect to
5 the primary document.

1 111. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to evaluate the received
3 at least one query result comprises computer-readable program code configured
4 to cause a computer to determine whether the query result is sufficiently relevant
5 with respect to a predetermined relevancy threshold;

6 and wherein the computer-readable program code configured to cause a
7 computer to display at least one received query result comprises computer-
8 readable program code configured to cause a computer to display a query result
9 responsive to the determination indicating that the query result is sufficiently
10 relevant.

1 112. The computer program product of claim 99, further comprising:
2 computer-readable program code configured to cause a computer to, after
3 receiving at least one query result, determine whether an addi-
4 tional query should be performed;
5 computer-readable program code configured to cause a computer to, re-
6 sponsive to a determination that an additional query should be
7 performed:

8 formulate an additional query containing at least one secondary
9 query key;
10 query at least one data source with the at least one secondary query
key;
11 receive at least one secondary query result from at least one data
12 source; and
13 display at least one received secondary query result;

1 113. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the query result in the context of a currently active
5 software application.

1 114. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the query result in a sidebar pane adjacent to a cur-
5 rently active on-screen window.

1 115. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to

4 cause a computer to display the query result in an on-screen window concur-
5 rently with display of a currently active on-screen window.

1 116. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the query result in an on-screen dialog box.

1 117. The computer program product of claim 99, wherein at least one of
2 the data sources comprises a network-connected computer containing shared in-
3 formation.

1 118. The computer program product of claim 99, wherein at least one of
2 the data sources comprises a shared directory.

1 119. The computer program product of claim 99, wherein the primary
2 document is one selected from the group consisting of:
3 an electronic communication;
4 a word processing document;
5 a spreadsheet document;
6 a task item;
7 a calendar item;
8 a file;

9 an image;
10 a sound recording;
11 a video recording; and
12 a contact record.

1 120. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to query at least one data
3 source comprises:

4 computer-readable program code configured to cause a computer to for-
5 mulate a structured query based on the extracted at least one
6 query key; and
7 computer-readable program code configured to cause a computer to
8 transmit the structured query to the at least one data source.

1 121. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to extract at least one
3 query key comprises computer-readable program code configured to cause a
4 computer to apply a part-of-speech analysis to the primary document.

1 122. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to evaluate the received
3 at least one query result comprises computer-readable program code configured

4 to cause a computer to apply a Bayesian belief net to determine estimated rele-
5 vance of the at least one query result.

1 123. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the result on a device that is intermittently con-
5 nected via a network.

1 124. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the query result in a calendar display.

1 125. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises computer-readable program code configured to
4 cause a computer to display the query result in a user-activated toolbar menu.

1 126. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to des-
5 ignate at least a portion of the primary document as a hyperlink;
6 and
7 computer-readable program code configured to cause a computer to, re-
8 sponsive to user activation of the hyperlink, display a query re-
9 sult.

1 127. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to dis-
5 play an on-screen button; and
6 computer-readable program code configured to cause a computer to, re-
7 sponsive to user activation of the button, display a query result.

1 128. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to dis-
5 play a toolbar menu activation button; and
6 computer-readable program code configured to cause a computer to, re-
7 sponsive to user activation of the button, display a query result.

1 129. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to dis-
5 play a menu comprising at least one command; and
6 computer-readable program code configured to cause a computer to, re-
7 sponsive to user selection of one of the at least one command,
8 display a query result.

1 130. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to dis-
5 play a menu activation icon;
6 computer-readable program code configured to cause a computer to, re-
7 sponsive to user activation of the menu activation icon, display
8 a menu comprising at least one command; and
9 computer-readable program code configured to cause a computer to, re-
10 sponsive to user selection of one of the at least one command,
11 display a query result.

1 131. The computer program product of claim 99, wherein the computer-
2 readable program code configured to cause a computer to display at least one
3 received query result comprises:

4 computer-readable program code configured to cause a computer to rec-
5 ognize user-entered text as having a format corresponding to a
6 predefined data type;
7 computer-readable program code configured to cause a computer to dis-
8 play a menu comprising at least one command applicable to the
9 data type; and
10 computer-readable program code configured to cause a computer to, re-
11 sponsive to user selection of one of the at least one command,
12 display a query result.